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AI-EDC-2013

# ANNUAL EXAMINATION, 2013

## Class - XI

## Subject - MATHEMATICS

Time : 3 hrs. M. M. : 100

***General Instructions :***

1. All questions are compulsory.
2. all questions in Section A are to be answered in one Word or one sentence and each question carries one mark.
3. In Section B each question carries 4 marks.
4. In Section C each question carries 6 marks.



## SECTION – A

1. Evaluate $\sin 130^\circ \cos 110^\circ + \cos 130^\circ \sin 110^\circ$

2. Find the inverse of functions : $x = \frac{3-5y}{2y-7}$

3. Evaluate $\left[i^{18} + \left(\frac{1}{i}\right)^{25}\right]$

4. What the length of latus rectum of the ellipse $16x^2 + y^2 = 16$

5. Let A = {1, 2, 3, 4, 5}. Define a relation R from A to A by $R = \{(x, y) : y = x + 3\}$

6. If ${}^nC_8 = {}^nC_2$ find $n$

7. If tanx = tany then x = ?

8. Find the sum of infinite G.P. $1, \frac{2}{3}, \frac{4}{9}$............

9. What is the probability that a letter choosen at random from word 'Equations : is a consonant?

10. If U = {1, 2, 3, 4, 5, 6, 7, 8, 9} A = {1, 2, 3, 4}

B = {2, 4, 6, 8} Find $(A - B)'$

## SECTION – B

11. A market research group conducted a survey of 1000 consumers and reported that 720 consumers like product A and 450 consumers like product B. What is the least number that must like both products.

12. Find the general solution of the equation: $\sin 3\theta + \cos 2\theta = 0$

OR

Prove that $\sin 3x + \sin 2x - \sin x = 4 \sin x \cos\frac{x}{2} \cos\frac{3x}{2}$

13. State and prove sine formula.

14. If pth, qth and rth terms of an A.P. are a, b, c, respectively. Show that :

$$(q-r)a + (r-p)b + (p-q)c = 0$$

OR

The sum of first three terms of a G.P. is $\frac{39}{10}$ and their product is 1. Find the common ration and the terms.

15. In how many ways can the letters of the word "Assassination" be arranged so that all the S's are together?

16. Find the equation of the circle passing through the points (–3, 4) (–2, 0) and (1, 5). Find the co-ordinates of the centre and radius of this circle.

17. If A and B be the points (3, 4, 5) and (–1, 3, – 7) respectively. Find the equation of the set of points P such that $PA^2 + PB^2 = 2k^2$, k is a constant.

18. Find the square root of $5 - 12i$

19. Prove that $1^2 + 2^2 + \ldots\ldots\ldots n^2 > \frac{n^3}{3} \; \forall n \in N$

20. Find the domain and range of the function f defined by $f(x) = \frac{1}{\sqrt{9 - x^2}}$

21. Write the negative of the following statement

(i) All triangles are not equilateral triangles

(ii) Every natural number is an integer

(iii) There does not exist a quadrilateral which has all its sides equal.

22. The probability that a student will pass the final examination in both English and Hindi is 0.5 and the probability of passing neither is 0.1. If the probability of passing the English exam. is 0.75. What is probability of passing the Hindi Exam.

## SECTION – C

23. (i) Evaluate $\lim_{x \to 3} \frac{x^4 - 81}{2x^2 - 5x - 3}$

(ii) Find the derivative from first principle of $f(x) = \sin\sqrt{x+1}$

24. Find the mean, variance and standard deviation

| Height cms | 70 – 75 | 75 – 80 | 80 – 85 | 85 – 90 | 90 – 95 | 95 – 100 | 100 – 105 | 105 – 110 | 110 – 115 |
|---|---|---|---|---|---|---|---|---|---|
| No. of Children | 3 | 4 | 7 | 7 | 15 | 9 | 6 | 6 | 3 |

25. Find the expansion of $(3x^2 - 2ax + 3a^2)^3$ using binomial theorem.

OR

Show that : $9^{n+1} - 8n - 9$ is divisible by 64.

26. Show that : $\dfrac{1\times 2^2 + 2\times 3^2 + \dots\dots\dots n\times(n+1)^2}{1^2\times 2 + 2^2\times 3 + \dots\dots\dots\dots n^2\times(n+1)} = \dfrac{3n+5}{3n+1}$

27. (i) Prove that : $\cos^2 x + \cos^2\left(\dfrac{\pi}{3} + x\right) + \cos^2\left(x - \dfrac{\pi}{3}\right) = \dfrac{3}{2}$

(ii) In $\Delta ABC$ prove that : $\dfrac{a-b}{a+b} = \dfrac{\tan\dfrac{A-B}{2}}{\tan\dfrac{A+B}{2}}$

28. Solve the following system of inequalities graphically

$3x + 2y \le 150$

$x + 4y \le 80$

$x \le 15,\ \ x \ge 0,\ \ y \ge 0$

29. (i) A line is such that its segment between the lines $5x - y + 4 = 0$, $3x + 4y - 4 = 0$ is bisected at the point (1, 5). Obtain its equation.

(ii) Find the points to which the origin should be shifted after shifting the origin so that the equation $x^2 - 12x + 4 = 0$ will have no first degree term.